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Study on changes in organoleptic quality of value added blended herbal Ready-to-serve (RTS) of aonla (*Emblica officinalis* Gaertn.) CV. NA-6 during storage period

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Abstract

An experiment was carried out to study changes in organoleptic quality of value added blended herbal Ready-to-serve (RTS) of aonla (*Emblica officinalis* Gaertn.) cv. NA-6 during storage period of the product in Department of Horticulture, Naini Agriculture Institute, SHUATS, Allahabad in the year 2016-2017. The concept was formulation of herbal aonla ready-to-serve beverage with three levels of each cardamom, ginger and tulsi as additives. The experiment was laid out in Complete Randomized Design (CRD) with three replication and nine treatments, T₁ being the control, T₂, T₃ and T₄ having 0.5%, 1% and 1.5 % cardamom powder respectively, T₅, T₆ and T₇ having 0.5%, 1% and 1.5 % ginger powder respectively and T₈, T₉ and T₁₀ having 0.5%, 1% and 1.5 % tulsi powder respectively. The product was stored in well sterilized glass bottles of 200 ml in post harvest laboratory at ambient conditions and data was collected from initial day to 90 days on the basis of its sensory properties such as colour, appearance, flavour, texture and taste. T₉ proved to be the best of all the treatments in overall acceptability of the product on the basis of sensory properties. T₈ (1% Basil powder) was found to be the most economic with the highest benefit: cost ratio of 1.93. The shelf life of the product was found to be in good condition upto 90 days.

Keywords: Aonla, cardamom, ginger, tulsi, herbal beverage, ready-to-serve

Introduction

Aonla or Indian gooseberry (*Emblica officinalis* Gaertn.) is an important minor crop grown in subtropics and tropics. Belonging to Euphorbiaceae family, it is native to tropical southeast Asia specially in Central and Southern India, Srilanka, Bangladesh, Malaya and china. India ranks first in area and production of aonla in the world and Uttar Pradesh is the leading state in area and production of aonla in India.

Aonla is a rare example of an edible material, which is rich in tannins as well as ascorbic acid (Kalra, 1988). The vitamin C content in aonla varies from 200-900 mg /100 g depending upon the variety and size of the fruit (Anonymous, 1988; Barthakur and Arnold, 1991). The fruit is highly nutritive and is the richest source of vitamin C (600mg/100g) among fruits, except Barbados Cherry (Asenjo, 1953). The aonla fruits are richest source of vitamin C being 200 to 1814mg/100g (Ram, 1990). However, it is not consumed much as fresh fruit as it is highly acidic and astringent in taste but several value added products like ready-to-serve beverage, nectar (Ram, 1984) syrup, jam, murabba, squash, pickles, laddu and candy (Pathak, 1990; Dean, 1992) have been developed from the fruit. These products can get position in national and international markets.

The post-harvest losses in aonla vary from 30% to 40% due to its perishable nature, which reduce the market value. Value addition through processing would be the only effective tool for economic utilization of increased production of aonla in the future. Processing not only reduces the post-harvest losses but also provides higher returns to the growers. A number of products such as murabba, pickle, candy, juice, squash, RTS (ready-to-serve beverage), jam, jelly, powder, etc., are prepared from aonla products.

Aonla juice can be blended with other fruit juices like lime, orange, pomegranate, ginger, etc. to improve nutritional quality, taste and consumer acceptance of RTS and make use of high vitamin C available in Aonla fruits. Processing of Aonla fruits is necessary for sustainable crop cultivation and alleviating malnutrition among rural population in addition to several health benefits. Blended RTS of Aonla with lime, orange, pomegranate and ginger for the production of new products is necessary for the survival and growth of the processing industry, to meet

new taste and demand in home as well as in export market.

Ready-To-Serve (RTS) is a type of fruit beverage containing at least fruit juice (10%), total soluble solids (10%) and acidity (0.3%) (F.P.O.1955). Blending of two or more fruit juices or blending the juice with herbal additives like tulsi, ginger, cardamom, stevia, lemongrass etc., for the preparation of ready-to-serve beverage appears to be a convenient and economic alternative for utilization of Aonla. Sandhu and Sindhu (1992), Saxena *et al.*, (1996), Attri *et al.*, (1998) and Langthasa (1999), have reported that two or more fruit juices/pulp may be blended in various proportions for the preparation of nectar, RTS beverage, etc.

Ginger acts as a useful food preservative and has been proven to kill the harmful bacteria *Salmonella* (Afshari, 2007). Green cardamom powder is used as a spice for sweet dishes as well as traditional flavoring in coffee and tea (Anand, 1970). Tulsi extracts are used in ayurvedic remedies for a variety of ailments. Beverages based on aonla and ginger and tulsi continues to receive a considerable amount of attention reflecting a growing awareness of the potential of these products in the market place as they have high nutritional quality and increased energy value. These could be particularly useful in place where there is lack of food and improper nutrition leading to deficiencies of certain nutrients (Bakhru, 1998).

Materials and Methods

Fully ripened, mature, fresh and sound aonla fruit were purchased from the orchard of the Department of Horticulture,

Sam Higginbottom University Agriculture Technology & Sciences, Allahabad and the materials such as Potassium Metasulphate (KMS) was sourced from the P.G. laboratory, Department of Horticulture, SHUATS, Allahabad. Commercial grade white crystalline cane sugar, good quality ready-made cardamom powder, ginger powder and tulsi powder were purchased from the market.

After pricking, fruits were dipped in 2% salt solution for 24 h., then washed with clean water and again dipped in 2% alum solution for 24 h., further washed with clean water and then boiled for 10-15 mins. Aonla fruits were washed in tap water and then seeds were removed. Fruit juice was extracted in a citrus juice extractor. After juice extraction, the juices were kept for 24 hours in refrigerator (4-2°C) for sedimentation.

Then the clear juice was siphoned off and strained through muslin cloth. Herbal (cardamom, ginger and tulsi) extracts were prepared with ratio 1:1 powder and water and was heated at 96°C for 15 minutes and also filtered through 8-fold cheese cloth. The prepared juice, KMS, and sugar were blended in high speed blender along with the other ingredients as shown in Table. 1. Treatment combinations were formulated with herbs (cardamom, ginger and tulsi) and sugar. The prepared beverage was kept in 200 ml transparent sterilized glass bottles. Then the samples were cooled with tap water and stored at 4°C. Treated RTS samples are evaluated at 0, 30, 60 and 90 days for organoleptic analysis of the product. The composition of ready to serve herbal aonla beverage was juice-10%, water-75%, KMS-0.3% and sugar-15%.

Table 1: Combination of herbs used in value added herbal ready-to-serve aonla beverage

Treatment symbols	Combination of herbs	Detail
T ₀	Plain product	Without herbal powder
T ₁	0.5%	Cardamom powder (C1)
T ₂	1.0%	Cardamom powder (C2)
T ₃	1.5%	Cardamom powder (C3)
T ₄	0.5%	Ginger powder (G1)
T ₅	1.0%	Ginger powder (G2)
T ₆	1.5%	Ginger powder (G3)
T ₇	0.5%	Basil powder (B1)
T ₈	1.0%	Basil powder (B2)
T ₉	1.5%	Basil powder (B3)

Organoleptic Analysis

The organoleptic evaluation of the beverage for assessing the colour, flavor, texture, appearance etc., were done by a panel of 6 judges who allotted marks on the basis of 9.0 Point Hedonic scale (Amerine *et al.*, 1965).

Statistical Analysis

Statistical analysis of data were done by using ANOVA on all experimental groups with three replicates each. The experimental groups were then separated statistically as described by Mukharjee and Sarolia, (2002).

Result and Discussions

Colour and Appearance

The effect of treatments on Colour and Appearance of Aonla RTS is herbs depicted in Table 2. T₉ was (mean score 7.26) ranked highest for Colour and (mean score 7.09) for appearance. Storage had a significant effect on colour perception of the drink.

Flavour and Taste

In organoleptic evaluation flavour and taste is very important

factor after colour and texture. Statistical Analysis revealed a significant effect of treatment and storage on flavour and taste Aonla RTS.

It was noted that Aonla products without herbs got less scores as compared to RTS samples in which combination of herbs were used. A significant variation was observed in flavour and taste of RTS at various storage levels. The maximum mean scores for flavour 8.08(T₉) and taste and 8.20 (T₈) were observed. As the storage period increased, a slight decline in flavour and taste score was experienced (Table 3).

Texture

Texture and body of the diet drink was affected significantly by treatments. Maximum mean score for texture (8.78) was observed in T₉ as shown in table 4.

The maximum scores for Colour, Appearance, flavour, taste and texture were observed when it was freshly prepared. As the storage period increased, a slight decline in sensory scores was observed. Previous studies by Bezman *et al.*, (2001) and Jain *et al.*, (2003) also reported similar loss during storage of beverage samples.

Overall Acceptability

Overall acceptability was influenced significantly with the treatment. Higher level of herbs could not produce top acceptability due to deviation from standard Colour and Texture. Flavour and taste of the product retained after 3rd month of storage. Though, the best mean result was recorded

in T₉ (8.08). Even control was not better as compared to different level of herbs. No certain pattern was observed with overall acceptability with treatment concerned. Storage duration had influence on overall acceptability which reduced after 90 days of storage (table 4).

Table 2: Effect of treatments on colour and appearance of herbal Aonla RTS.

Treatments	Colour					Appearance				
	Initial day	30 days	60 days	90 days	mean	Initial day	30 days	60 days	90 days	mean
T ₀	6.87	6.16	5.83	5.00	5.97	6.87	6.16	5.98	5.88	6.22
T ₁	7.04	6.33	6.00	5.83	6.30	6.89	6.18	6.03	5.90	6.25
T ₂	7.38	6.67	6.50	6.00	6.64	6.92	6.21	6.00	5.94	6.27
T ₃	7.36	6.65	6.00	6.00	6.50	6.97	6.26	6.16	6.16	6.39
T ₄	7.39	6.68	6.67	6.50	6.81	6.99	6.28	6.21	6.44	6.48
T ₅	7.54	6.83	6.50	6.67	6.92	7.02	6.31	6.31	5.92	6.65
T ₆	8.04	7.33	6.67	6.67	7.18	7.31	6.60	6.73	6.25	6.72
T ₇	7.71	7.00	6.83	6.50	7.09	7.38	6.67	6.55	6.62	6.81
T ₈	8.04	7.33	6.67	6.80	7.18	7.75	7.04	6.15	6.88	6.96
T ₉	8.21	7.50	6.83	6.83	7.26	7.94	7.23	6.89	6.97	7.05
C.D. at 5%	0.706	0.699	0.628	1.101		0.653	0.540	0.524	0.530	
S. Ed. (±)	0.333	0.330	0.296	0.519		0.308	0.255	0.247	0.250	

Table 3: Effect of treatments on flavour and taste of herbal Aonla RTS

Treatments	Flavour					Taste				
	Initial day	30 days	60 days	90 days	mean	Initial day	30 days	60 days	90 days	mean
T ₀	6.91	6.20	5.70	5.00	5.95	8.01	7.30	7.25	6.58	7.29
T ₁	7.21	6.50	5.80	5.50	6.25	8.06	7.35	7.31	6.67	7.35
T ₂	7.21	6.50	6.00	6.00	6.43	8.06	7.35	7.30	6.70	7.35
T ₃	7.41	6.70	6.30	6.00	6.60	8.26	7.55	7.41	7.00	7.56
T ₄	7.41	6.70	6.50	7.00	6.90	8.41	7.70	7.23	7.05	7.61
T ₅	7.71	7.00	6.50	7.00	7.05	8.28	7.57	7.44	7.33	7.66
T ₆	7.91	7.20	6.70	7.00	7.20	8.48	7.77	7.48	7.39	7.78
T ₇	8.21	7.50	6.80	8.00	7.63	8.71	8.00	7.78	6.95	8.04
T ₈	8.51	7.80	6.80	8.00	7.78	8.96	8.25	7.92	7.67	8.20
T ₉	9.01	8.30	7.00	8.00	8.08	9.26	8.55	8.00	7.67	8.19
C.D. at 5%	0.758	0.854	0.680	1.153		0.758	0.647	0.524	0.114	
S. Ed. (±)	0.357	0.403	0.321	0.544		0.357	0.305	0.247	0.054	

Table 4: Effect of treatments on texture and overall acceptability of herbal Aonla RTS

Treatments	Texture					Overall acceptability				
	Initial day	30 days	60 days	90 days	mean	Initial day	30 days	60 days	90 days	mean
T ₀	7.05	6.34	6.24	6.16	6.45	7.38	6.67	6.60	6.55	6.80
T ₁	7.17	6.46	6.39	6.29	6.58	7.41	6.70	6.69	6.67	6.87
T ₂	7.38	6.67	6.44	6.30	6.70	7.54	6.83	6.81	6.77	6.99
T ₃	7.63	6.92	6.76	6.55	6.97	7.63	6.92	6.83	6.80	7.05
T ₄	7.93	7.22	6.83	6.67	7.16	7.81	7.10	7.00	6.92	7.21
T ₅	8.01	7.30	7.25	6.92	7.37	7.96	7.25	7.20	7.00	7.35
T ₆	8.26	7.55	7.41	7.39	7.65	8.04	7.33	7.25	7.10	7.43
T ₇	8.45	7.74	7.67	7.58	7.86	8.16	7.45	7.42	6.67	7.58
T ₈	8.80	8.09	7.92	7.83	8.16	8.54	7.83	7.77	7.35	7.75
T ₉	9.54	8.83	8.81	7.92	8.78	8.64	7.93	7.90	7.83	8.08
C.D. at 5%	1.173	1.062	0.940	1.153		0.550	0.543	0.732	0.152	
S. Ed. (±)	0.553	0.501	0.443	0.544		0.259	0.256	0.345	0.072	

Conclusion

It can be concluded from this study that herbs can be effectively used as an alternative source of value addition in aonla ready-to-serve beverage. On the basis of results obtained, it may be concluded that T₉ (1.5% Tulsi powder) can be used in commercialization of value added herbal ready-to-serve beverage of aonla. The product remain in acceptable condition even after 90 days of storage.

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